Engineering Report on
PROPOSED GOVERNMENT CENTER
for the
CITY OF BOSTON

Prepared for

BOSTON CITY PLANNING BOARD

BOSTON, MASSACHUSETTS

JUNE 1959

DE LEUW, CATHER & COMPANY

CONSULTING ENGINEERS

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CHICAGO NEW YORK BOSTON TORONTO OKLAHOMA CITY SAN FRANCISCO
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June 30, 1959

Boston City Planning Board
City Hall
Boston, Massachusetts

Gentlemen:

In accordance with our agreement with the Boston City Planning Board, we submit herewith the engineering report for the Government Center. Included are preliminary estimates of cost and list of accompanying plans.

Very truly yours,

DE LEUW, CATHER & COMPANY

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INTRODUCTION

The essence of this report, including plans and preliminary cost estimates, is to provide factual data for the planning of the Government Center. This project would provide an attractive group of buildings, streets and plazas to replace a portion of the city that is much in need of redevelopment.

The phases of work covered in this report are studies of vehicular traffic and circulation, public utilities adjustments and revisions to existing subway stations. The engineering work has been closely coordinated with the planning consultants to provide sound engineering principals as a basis for redevelopment within the project area.

Although much has been done to acquaint the local and state departments involved with the concepts of this project, further co-ordination and planning is required prior to actual construction.

INTRODUCTION

The essence of this report, including plans and preliminary cost estimates, is to provide factual data for the planning of the Government Center. This project would provide an attractive group of buildings, streets and plazas to replace a portion of the city that is much in need of redevelopment.

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TRAFFIC CIRCULATION AND STREET DESIGN

The area under study for the proposed Government Center is in the oldest portion of the original Boston peninsula. When the streets in this section of the city were laid out, the automobile was still two hundred years in the future, but they served adequately for a market area near the docks in one of the major seaports in the country. Since that time the streets have been widened and paved, the Sumner Tunnel and the Central Artery have been built, but local street patterns have remained the same. Local streets in this area are inadequate for the existing traffic and for the ever increasing traffic.

In planning streets for the Government Center Area, many factors have been taken into account to provide a circulatory traffic system that will be ample for future as well as present traffic through this area and at the same time provide the land sites desired. The street pattern herewith presented has been based primarily on the following factors:

1. Sites for proposed city, county, state, federal and commercial buildings as presented by the planning consultant.
2. The traffic from the Sumner Tunnel with the additional traffic that will enter the area with the construction of an additional tube.
3. Traffic to and from the Central Artery through the Government Center Area which will increase with the completion of the Southeast Expressway, the Northern Expressway, the Northeast Expressway, the Northwest

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2. The traffic from the Sumner Tunnel with the additional traffic that will enter the area with the construction of an additional tube.
3. Traffic to and from the Central Artery through the Government Center Area which will increase with the completion of the Southeast Expressway, the Northern Expressway, the Northeast Expressway, the Northwest

Expressway, the extension of the Massachusetts Turnpike in Boston and the Inner Belt.

4. Traffic patterns and flow on local streets surrounding the Government Center Area.

The streets as presented in the enclosed plans have been planned through close liaison with the planning consultant and will provide ample ingress and egress to the Central Artery and the Sumner Tunnel through the Government Center Area. At the same time local access to building sites within the area has been provided for with consideration for future expansion of this area. The plans conform with existing conditions for access to the Central Artery and the Sumner Tunnel and are adaptable to the Basic Plan for Vehicular Circulation in the Retail Core Study Area by the City Planning Board.

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TRAFFIC STUDIES

The area for the proposed Government Center is now a decaying part of the city with narrow streets, congested traffic conditions, inadequate parking facilities and a limited recognizable traffic pattern. With the construction of the Government Center, the street pattern will be changed to afford ample access to and through the area. Streets have been placed so as to accommodate the major traffic movements and at the same time conform with the existing traffic conditions that surround the Government Center.

Future traffic estimates for the Government Center Area are based on the construction and completion of major arteries that will stimulate traffic to downtown Boston. The additional traffic that will flow into the area upon construction of the second tube of the Sumner Tunnel has been considered. Central Artery traffic figures are based on the completion and construction of the Southeast Expressway, the Northeast Expressway, the Northern Expressway, the Northwest Expressway, the Inner Belt and the extension of the Massachusetts Turnpike into Boston. At-grade traffic through the area will increase as the aforementioned arteries are joined to the Central Artery which will be unable to handle the volumes of anticipated traffic desiring to use it. This overflow of traffic will seek local routes to their destinations. Also taken into consideration are the number of vehicular trips into the area for business purposes within the area. The total estimated future daily traffic in the Government Center Area appears on the plan titled "Estimated Future Traffic Flow".

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The street pattern proposed for the Government Center conforms with the traffic pattern through the area. Traffic from the two major sources, the Sumner Tunnel and the Central Artery will have ample access for a smooth flow of traffic. The three major movements will be on Sudbury Street (relocated) where an overpass has been incorporated to alleviate congestion, on Cambridge Street connected with Tremont Street through Scollay Square and on Portland Street connected with Congress Street and Devonshire Street. A proposed ramp has been provided for southbound Central Artery traffic to Cambridge Street and Tremont Street as this volume of traffic, added to Washington Street North traffic, would cause excessive congestion at the intersection with Portland Street. An addition to the existing southbound ramp at North Street and the improvement of Richmond Street will afford ample connections with the Central Artery for traffic to and from the south.

With the street pattern as shown in the plans presented herewith, the traffic anticipated for the future should flow with a minimum of congestion through the proposed Government Center. As future redevelopment of surrounding areas occur, the opportunity for improving traffic conditions in those areas will be manifest, thus contributing to improved flow in the Government Center street system.

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PRELIMINARY STUDIES

In the initial study for a circulatory traffic system, DeLeuw, Cather & Company prepared several plans for a traffic system through the study area based on circulation alone which were presented to the planning consultant on December 29, 1958. At subsequent meetings with the planning consultant these plans and plans by the planning consultant based primarily on land use were discussed. On January 19, 1959 the planning consultant presented four schemes for the area based on land use. These plans were reviewed by us and comments and further plans sent to the planning consultant on January 23, 1959.

Further studies were then made by the planning consultant to co-ordinate the circulatory traffic schemes with the most feasible land use for the area. On January 30, 1959 the planning consultant presented the scheme dated January 30, 1959 which, after further studies, was changed to a scheme dated February 13, 1959. This plan, with further revisions dated March 4, 1959, was the plan decided upon as the basic plan for the Government Center Area. Studies of street location, site size and location, and the project boundary for the Government Center continued through April. The final circulation plan dated May 4, 1959 as presented by the planning consultant, with minor revisions of some local streets and the project boundary is the scheme upon which the plans for street layout, estimates for future traffic flow, circulation of traffic, channelization, traffic signal control, utility relocation, subway station revisions and the estimates of costs for the afore-mentioned improvements and revisions have been based.

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STREET LAYOUT AND DESIGN

The plans presented herewith are based on the circulation scheme developed by the planning consultant. Since the Sumner Tunnel and the Central Artery are the major traffic generators in the study area, street layout and design has provided for a smooth flow of traffic to and from these facilities, through the Government Center Area, to the adjoining commercial and residential districts. Other streets also provide access to the sites within the area.

Access to Sumner Tunnel

Access to the Sumner Tunnel has been provided through the Government center Area in the following manner. Cambridge Street traffic will turn onto the overpass on the proposed Sudbury Street (relocated). This leads directly to the tunnel. Congress Street traffic will turn toward the tunnel at grade on the same proposed street. Vehicles from the West End Development and the North Station area can proceed to the tunnel via Merrimac Street and Portland Street, turning left onto the proposed Sudbury Street (relocated) on signal. Beacon Street traffic can move down Somerset Street, onto the overpass and to the tunnel. Washington Street traffic will reach the tunnel either via Congress Street or by Court Street, the Cambridge Street connection with Tremont Street and the overpass.

The two existing ramps from the Central Artery at North Street will be for tunnel traffic only so as to prevent congestion and provide for the traffic volumes anticipated. Vehicles on Cross Street would be prevented from crossing the tunnel plaza by placement of traffic

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islands and signs, thus eliminating a movement interfering with tunnel traffic.

Access to the Central Artery Southbound from Government Center Area

Vehicles desiring to go south on the Central Artery will follow the same pattern through the Government Center as those desiring to go to the Sumner Tunnel. Vehicles using the overpass on the proposed Sudbury Street (relocated) will have direct access via an existing ramp in the Haymarket Square area. An addition to the existing entrance ramp from the market area by Clinton Street would afford access for traffic at grade from the proposed Sudbury Street (relocated) as well as the market area. Traffic from the West End Development Area has access by an existing ramp at Causeway Street.

Access to the Central Artery Northbound from Government Center Area

There are two available northbound entrance ramps to the Central Artery. Vehicles from the commercial area using Washington Street or Congress Street may use the State Street ramp. All other traffic through the Government Center Area will follow the pattern for tunnel traffic, entering the northbound artery ramp by North Street. The weaving movement caused by conflict of traffic entering this ramp and tunnel traffic from the southbound artery tunnel ramp can not be eliminated without major ramp changes in this area.

Access from Sumner Tunnel to Government Center Area

The traffic from the Sumner Tunnel that does not enter the Central Artery will travel along Cross Street under the artery. Here they may enter Washington Street North by the connection under the Central

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<u>Access to the Central Artery Southbound from Government Center Area</u>

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The traffic from the Sumner Tunnel that does not enter the Central Artery will travel along Cross Street under the artery. Here they may enter Washington Street North by the connection under the Central

Artery, stay at grade on Sudbury Street (relocated) for access to Portland Street and Devonshire Street or use the overpass on Sudbury Street (relocated) for access to Tremont Street and Cambridge Street.

Access from Central Artery Southbound to Government Center Area

The vehicles from the Central Artery which desire to use Portland Street or Devonshire Street will use the existing ramp which now leads into Haymarket Square. A proposed ramp should be constructed from the top of the existing ramp mentioned above to the overpass on Sudbury Street (relocated) for vehicles desiring access to Cambridge Street and Tremont Street. If the proposed ramp were not built, the volume of traffic entering this area via the one existing ramp would cause excessive congestion and delay at the intersection of Washington Street North and Portland Street.

Access from Central Artery Northbound to Government Center Area

Persons desiring to enter the Government Center Area from the Central Artery Northbound will have several choices. They may leave the Central Artery at Northern Avenue and travel along under the Central Artery or on Atlantic Avenue, entering the commercial district by local streets or the Government Center Area via State Street and Court Street. Northbound artery traffic could also enter the Government Center Area from the Mercantile Street ramp via Clinton Street, Atlantic Avenue and State Street. However, State Street as an access roadway is of inadequate width between Broad Street and McKinley Square. Widening is necessary and could be accomplished by recessing the sidewalks within the building fronts. Vehicles from the Mercantile Street exit ramp would be able to enter the Government Center by

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proceeding on Mercantile Street, Richmond Street and Hanover Street. These streets, although outside the project boundary should be improved for a better traffic flow as vehicles will be prohibited from crossing the entrance and exit of the two tunnels. Vehicles desiring access to the Portland Street area could leave the artery on the ramp to Causeway Street and proceed on either Causeway Street or Washington Street North. Although the traffic pattern presented does not provide a direct route into the Government Center, ample access to the area has been provided.

Access in Area of State Office Building

Change in street pattern in the area of the proposed State Office Building is limited by the existing streets adjacent to the area which can not be widened due to building locations. Bowdoin Street and Somerset Street between Beacon Street and Ashburton Place are limited to their present width, thus precluding two way traffic. Bowdoin Street has been widened to provide for two way traffic for ample access to the State Office Building underground garage. Somerset Street provides for one way traffic due to lack of space for widening the street between the Old Court House and the M. D. C. Building. Direction of traffic in the area of the State House will remain the same. Ashburton Place has been widened to provide access to the street around the Court House through Pemberton Square. These streets, although out of the project area, affect traffic in the area.

Access to Washington Street North

Access to Washington Street North has been provided by extending this street to Portland Street. There will be an unbroken median from Portland Street past the Central Artery. This will eliminate turns

proceeding on Mercantile Street, Richmond Street and Hanover Street. These streets, although outside the project boundary should be improved for a better traffic flow as vehicles will be prohibited from crossing the entrance and exit of the two tunnels. Vehicles desiring access to the Portland Street area could leave the artery on the ramp to Causeway Street and proceed on either Causeway Street or Washington Street North. Although the traffic pattern presented does not provide a direct route into the Government Center, ample access to the area has been provided.

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Access to Washington Street North

Access to Washington Street North has been provided by extending this street to Portland Street. There will be an unbroken median from Portland Street past the Central Artery. This will eliminate turns

into the northbound lane from the Central Artery ramp, Canal Street and Friend Street as there is limited sight distance at these intersections. This street provides ample access to and from the Charlestown Bridge.

Overpass on Sudbury Street (relocated)

The overpass over Portland Street is required in the street pattern to provide a smooth flow of traffic connecting the Sumner Tunnel and the Central Artery with the center of Boston. Without an overpass at this point the intersection at grade would be unable to handle the volume of traffic involved without congestion and delay.

The overpass should have a maximum grade of not more than 5% and a minimum clearance of 14 feet over Portland Street. It would provide two 12-foot lanes in each direction with a 2-foot shoulder on exterior edges. Concrete curbing and heavy iron pipe rails will be provided on each side of the overpass and a 4-foot median will divide traffic flowing in opposite directions.

Proposed Ramp Connecting Central Artery with Overpass

The proposed ramp connecting southbound Central Artery traffic with the proposed overpass over Portland Street is necessary to handle the anticipated volume of traffic through the Government Center Area as this is the only exit between the Charles River and Fort Hill Square for non-tunnel traffic. The existing ramp to Haymarket Square would be used by vehicles desiring to travel on Portland Street or Devonshire Street. The proposed ramp would connect Central Artery traffic with Cambridge Street, Tremont Street and the State House area.

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The proposed ramp would conform to ramp design of the Central Artery. Minimum clearance under the ramp to streets on grade would be 14 feet. Width of pavement on the ramp would be 28 feet. Detailed design and construction must take into consideration that this ramp must cross over the subway station at Haymarket Square.

This ramp exit from the Central Artery is combined with the existing ramp to Haymarket Square and affords a distance of 250 feet prior to the division of the two ramps. Traffic on the Sudbury Street overpass should be channelized into the left hand lane to provide for ramp traffic entering the right hand lane on the overpass.

Sumner Tunnel Plaza

The Sumner Tunnel will probably be a two tube, four lane tunnel by the time the Government Center is constructed. Thus the second tube has been included in the plans. Channelization has been provided to direct inbound and outbound traffic with provisions for thee lane flow in either direction as demanded by traffic conditions. There will be no Cross Street traffic flow across the tunnel plaza to interfere with tunnel traffic. Toll collection will be on the East Boston end of the tunnel

Blackstone Street

Blackstone Street as shown in the plans provides for three lanes of traffic toward the Sumner Tunnel and the Central Artery. The section of this street between Hanover Street and North Street has been placed as near the existing Central Artery ramp as possible to provide a maximum width for the existing Blackstone Street serving the market area.

The proposed ramp would conform to ramp design of the Central Artery. Minimum clearance under the ramp to streets on grade would be 14 feet. Width of pavement on the ramp would be 28 feet. Detailed design and construction must take into consideration that this ramp must cross over the subway station at Haymarket Square.

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Blackstone Street as shown in the plans provides for three lanes of traffic toward the Sumner Tunnel and the Central Artery. The section of this street between Hanover Street and North Street has been placed as near the existing Sentral Artery ramp as possible to provide a maximum width for the existing Blackstone Street serving the market area.

A median with a high fence would divide local traffic for the market district from the through traffic for the tunnel and the Central Artery.

Addition to Southbound Central Artery Ramp at Clinton Street

To conform with the traffic pattern of the Government Center an addition should be made to the existing southbound Central Artery ramp at Clinton Street to provide access to this ramp for on-grade traffic from Sudbury Street (relocated). At the same time the existing ramp would provide access from the market area. The ramp addition would be approximately 200 feet long, 28 feet wide and would permit traffic on Blackstone Street to enter the Central Artery going south.

Street Widths

Street widths for the proposed streets in the Government Center have been based on future traffic assignments to these streets. Traffic lane widths are 12 feet and parking lanes are 8 feet wide. A median has been provided on four lane roads to separate traffic flowing in opposite directions and to increase safety.

Street widths are shown on the plans of the streets and on the typical roadway sections. Following is a description of the streets.

Relocated Sudbury Street

Cambridge Street to Portland Street - Total width 126 feet

Overpass 4 - 12-foot lanes plus two shoulders of 2 feet and a 4-foot median

At grade - 2 streets of 2 - 12-foot lanes and an 8-foot parking lane.

North of Portland Street - Total width 114 feet

Overpass - Same as above

At grade - 2 streets of 2 - 12-foot lanes with a 2-ft. shoulder.

A median with a high fence would divide local traffic for the market district from the through traffic for the tunnel and the Central Artery.

Addition to Southbound Central Artery Ramp at Clinton Street

To conform with the traffic pattern of the Government Center an addition should be made to the existing southbound Central Artery ramp at Clinton Street to provide access to this ramp for on-grade traffic from Sudbury Street (relocated). At the same time the existing ramp would provide access from the market area. The ramp addition would be approximately 200 feet long, 28 feet wide and would permit traffic on Blackstone Street to enter the Central Artery going south.

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Relocated Sudbury Street

Cambridge Street to Portland Street - Total width 126 feet

Overpass 4 - 12-foot lanes plus two shoulders of 2 feet and a 4-foot median

At grade - 2 streets of 2 - 12-foot lanes and an 8-foot parking lane.

North of Portland Street - Total width 114 feet

Overpass - Same as above

At grade - 2 streets of 2 - 12-foot lanes with a 2-ft. shoulder.

Cambridge Street to Tremont Street

Bowdoin Street to Somerset Street - Total width 80 feet

Four traffic lanes 12 feet wide, two parking lanes 8 feet wide, a 6-foot median and a storage lane 10 feet wide for left hand turns into the relocated Sudbury Street and into Bowdoin Street.

Somerset Street to Court Street - Total width 70 feet

Four traffic lanes 12 feet wide with a 6-foot dividing median and two 8-foot parking lanes.

Tremont Street south of Court Street - Total width 32 feet

Two 12-foot traffic lanes and one 8-foot parking lane for one-way traffic.

Portland Street Extended to Devonshire Street and Congress Street

Pitts Street to Hanover Street - Total width 70 feet but varies

Four 12-foot traffic lanes and two parking lanes divided by a 6-foot median which widens to meet the existing Portland Street and Merrimac Street at Pitts Street

Hanover Street to State Street

Four 12-foot traffic lanes and two 8-foot parking lanes with a median that varies from 6 feet at Hanover Street to meet existing conditions at Congress Street and Devonshire Street. Lane width on Congress Street varies from 40 feet to meet existing conditions near State Street to 32 feet toward Hanover Street. The Devonshire Street side of the street will maintain a constant width of 32 ft.

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Four traffic lanes 12 feet wide, two parking lanes 8 feet wide, a 6-foot median and a storage lane 10 feet wide for left hand turns into the relocated Sudbury Street and into Bowdoin Street.

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Blackstone Street

Three 12-foot traffic lanes with a 2-foot shoulder on south side of street for a total width of 38 feet. A 3-foot median with a fence will divide this traffic from the local street to serve the market area.

Washington Street North extended to Portland Street

Four 12-foot traffic lanes and two 8-foot parking lanes divided by a 6-foot median. Total width 70 feet.

Hanover Street, Chardon Street, Green Street (relocated), Union Street and Ashburton Place

Two 12-foot traffic lanes and two 8 foot parking lanes for a total width of 40 feet for two-way traffic.

Somerset Street and Court Street

Two 12-foot traffic lanes with no provisions for parking. One-way traffic only will use these streets.

Cross Street

Three 12-foot traffic lanes. This street is now of ample width, but parking along north side will have to be eliminated as traffic volumes increase.

Bowdoin Street between Ashburton Place and Cambridge Street

Four 12-foot traffic lanes with a 4-foot median. No parking lane provided. Total width of 52 feet.

Blackstone Street

Three 12-foot traffic lanes with a 2-foot shoulder on south side of street for a total width of 38 feet. A 3-foot median with a fence will divide this traffic from the local street to serve the market area.

Washington Street North extended to Portland Street

Four 12-foot traffic lanes and two 8-foot parking lanes divided by a 6-foot median. Total width 70 feet.

Hanover Street, Chardon Street, Green Street (relocated), Union Street and Ashburton Place

Two 12-foot traffic lanes and two 8 foot parking lanes for a total width of 40 feet for two-way traffic.

Somerset Street and Court Street

Two 12-foot traffic lanes with no provisions for parking. One-way traffic only will use these streets.

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Three 12-foot traffic lanes. This street is now of ample width, but parking along north side will have to be eliminated as traffic volumes increase.

Bowdoin Street between Ashburton Place and Cambridge Street

Four 12-foot traffic lanes with a 4-foot median. No parking lane provided. Total width of 52 feet.

State Street

State Street should be wider between Broad Street and McKinley Square as there is a restriction of an otherwise ample roadway. Sidewalks could be placed inside the building lines, thus using the sidewalks for pavement, widening this section of the street to 34 feet.

Central Artery Ramps

Ramp additions would be 28 feet wide and conform with existing ramp design.

Street widths where proposed streets meet existing streets will conform with the pavement width of the existing streets.

Parking

Parking in the Government Center has been provided for by designating certain land parcels for public and private garages and surface parking lots. These parking areas should have access on secondary streets rather than on the heavily traveled streets so as not to interfere with heavy through traffic. Streets in the project area have been designed with an eight-foot parking lane where feasible for on-street parking. The total parking area within the project area can be increased to comply with future parking demand by the construction of garages.

Curbs

Curb heights of 7 inches have been shown. This would permit one resurfacing of the streets without changing curb heights and at the

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Curbs

Curb heights of 7 inches have been shown. This would permit one resurfacing of the streets without changing curb heights and at the

same time provide a comfortable height for pedestrians desiring to cross the streets.

Sidewalks

The sidewalks for the Government Center have been located to conform with the architectural scheme developed by the planning consultant. Ten foot wide sidewalks have been provided throughout the Government Center with the exception of the area west of Cambridge Street where a sidewalk width of thirty feet has been provided. Sidewalks appear on the plan titled "Street Improvements Plan" and on the detailed street plans.

Channelization

Intersection design for the channeling of traffic together with traffic control signal locations are included in the plans. By means of medians and islands traffic will be permitted to travel with a minimum of interference and congestion in a pattern calculated to provide a free flow of traffic with a maximum of safety.

Rightof-Way

The right-of-way for the proposed streets provides for width of pavement, medians, channelization islands, curbs and sidewalks. Public open areas and pedestrian walkways not adjacent to streets have not been included in street right-of-way. Proposed new street right-of-way appears on the plan titled "Right of Way Adjustments Plan" Also shown on this plan is the existing right-of-way that will be abandoned to private land parcels with the construction of the Government Center.

TRAFFIC CONTROL SIGNALS

In the area encompassed by the proposed Government Center, the principal northwest-southeast arteries (proposed) have been provided, namely to Cambridge Street connected with Tremont Street and a Portland Street extension to Congress and Devonshire Streets.

In the Cambridge Street-Scollay Square area existing traffic control signals are located at Bowdoin, Somerset, Hanover and Court Streets. The proposed traffic pattern will require traffic control signals at the same locations.

Along Washington Street in the Government Center Area, traffic control signals exist at Cornhill, Elm Street and Hanover Street. There is also a traffic control signal at the intersection of Portland and Hanover Streets. The proposed traffic pattern will require traffic control signals on the relocated Portland Street at Hanover Street, Sudbury Street (relocated) and at a Washington Street North connection 250 feet northwest of Sudbury Street (relocated).

The existing signals noted above are a part of the Boston Unit No. 1 interconnected signal system. This system, because of its early installation about 30 years ago, operates without advantage of the many signal improvements developed over the years since the original installation. Eventually the City will find it advisable to replace outdated signal control equipment with modern apparatus. With this eventuality in mind it is recommended that new traffic control signal equipment for the Government Center area be of modern design and operated independent of the old system.

With the master control panel located in the new City Hall, a start will have been made for the modernization of the entire Unit No. 1 system.

Multi-dial, expansible, local controllers to operate under the direct supervision of a remote master-control for dial selection, synchronization, flashing operation and fire-lane sequence are recommended.

Interconnecting cable conduit should be provided between all intersections and extended to the limit of all new street pavements to permit connection with existing or proposed interconnecting conduit beyond the Government Center area limits. This conduit may be provided separately and only for the purpose described or may be spare conduit lines of the Boston Edison Company reserved for city uses. A suitable master signal controller panel location should be provided within the new City Hall, with conduit to provide cable connection with the local controllers of the signal system.

Proposed traffic control signal layouts are included in the drawings accompanying this report. Liberal use of signal housings have been made to provide a visible indication to pedestrians at each end of each cross-walk.

Color sequence and timing schedules for proposed traffic control signal installations follow. The interval timing shown is arbitrary and for illustrating purposes only. Actual timing would rely on traffic volumes after installation.

CAMBRIDGE STREET - SCOLLAY SQUARE

A. - At Bowdoin Street

Intervals	1	2	3	4	5	6	7	8
Seconds	38	4	15	4	15	4	17	3
Cambridge St. Eb'd	VA-RA	Y	R	Y	R	R	RY	R
Cambridge St. Wb'd	VA	VA	LA-VA	Y	R	R	RY	R
Bowdoin St. Nb'd	R	R	R	R	G	Y	RY	R
Pedestrians Only	R	R	R	R	R	R	RY	R

B. - At Somerset Street and Sudbury Street (relocated)

Intervals	1	2	3	4	5	6	7	8
Seconds	20	4	28	4	20	4	17	3
Cambridge St. S.Eb'd	R-LA	Y	VA	Y	R	R	RY	R
Cambridge St. N.Wb'd	R	R	VA-RA	Y	R	R	RY	R
Sudbury St. S.Wb'd	R-RA	Y	R	R	LA-RA	Y	RY	R
Somerset St. N.Eb'd	VA-RA	Y	R	R	R-LA	Y	RY	R
Sudbury St. * S.Wb'd	R-RA	R-RA	R-RA	R-RA	R-RA	Y	RY	R
Pedestrians Only	R	R	R	R	R	R	RY	R

* Roadway at grade from Portland Street.

C. - At Hanover Street

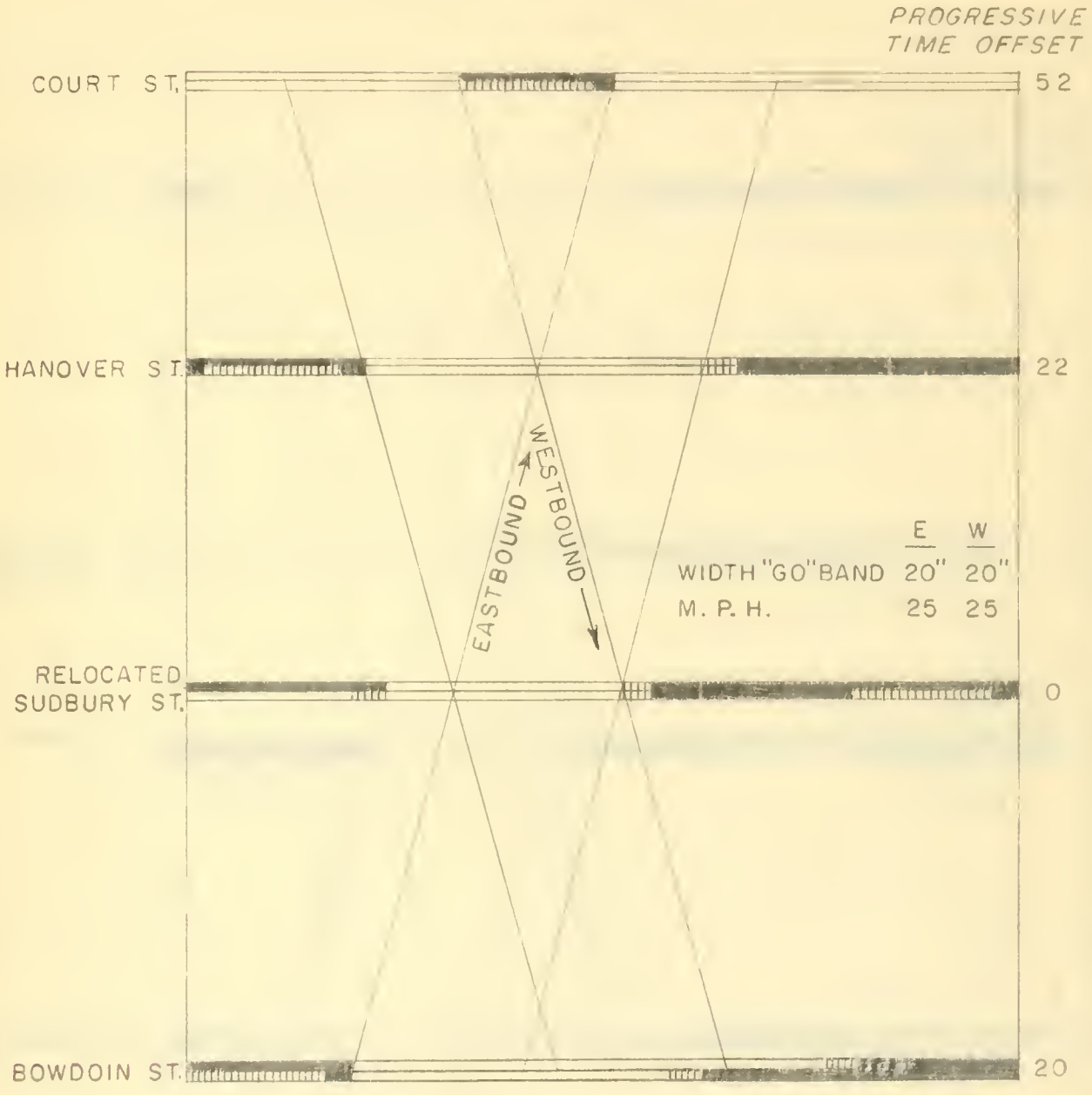
Intervals	1	2	3	4	5	6
Seconds	40	4	32	4	17	3
Scollay Sq. Sb'd	LA-VA	Y	R	R	RY	R
Scollay Sq. Nb'd	VA-RA	Y	R	R	RY	R
Hanover St. Wb'd	R	R	LA-RA	Y	RY	R
Pedestrians Only	R	R	R	R	RY	R

D. - At Court Street

Intervals	1	2	3	4
Seconds	76	4	17	3
Scollay Sq. Sb'd	R-VA	Y	RY	R
Court St. Wb'd	LA-RA	Y	RY	R
Pedestrians Only	R	R	RY	Y

GOVERNMENT CENTER STUDY

PROPOSED 100 SECOND CYCLE
TRAFFIC CONTROL SIGNAL TIME - SPACE PROGRESSIVE DIAGRAM
FOR CAMBRIDGE ST. - SCOLLAY SQUARE



GREEN YELLOW RED

VERTICAL SCALE 1"=200 Ft.

HORIZONTAL SCALE 1"=20 Sec.

NOTE:

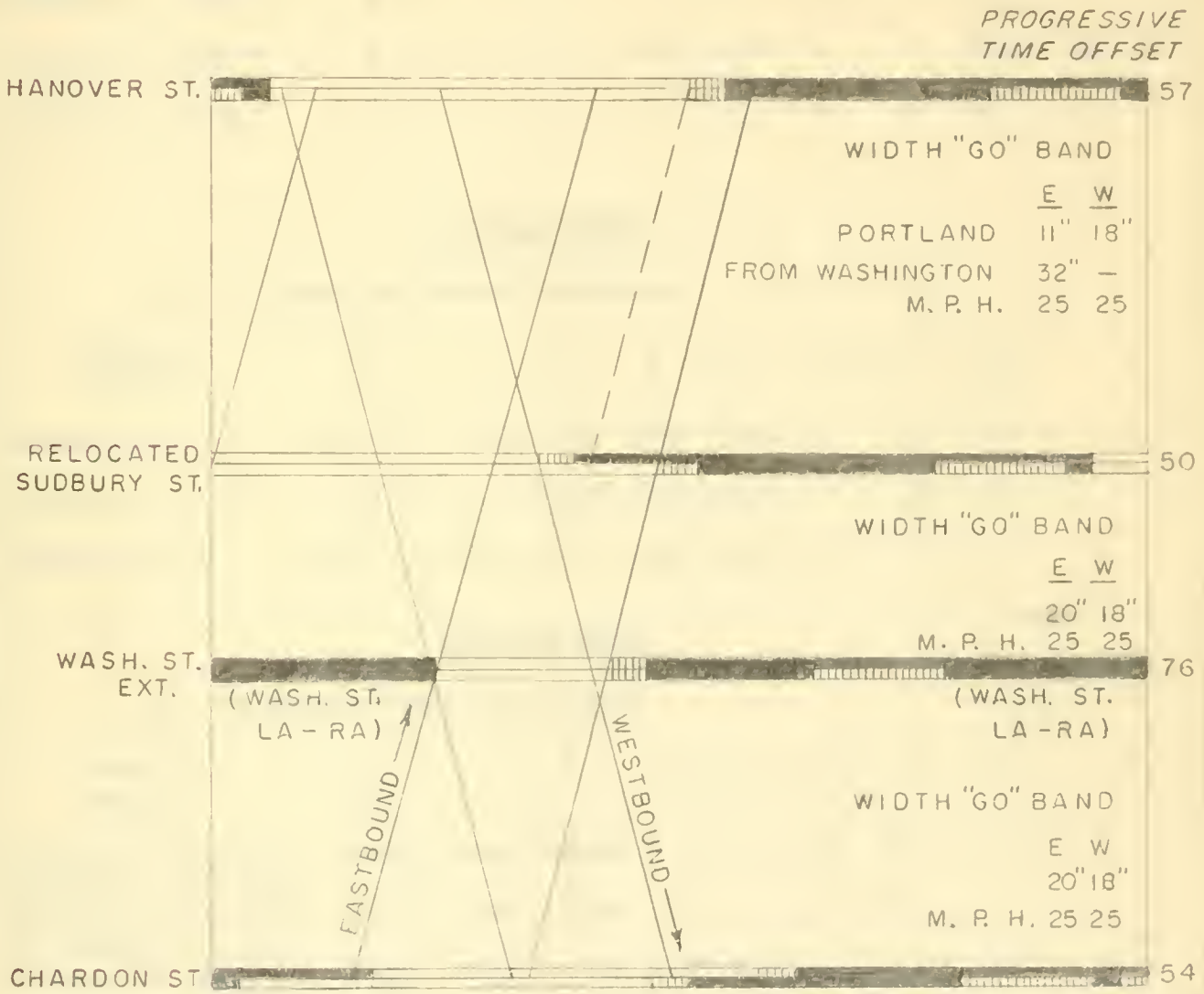
Zero offset is beginning of right-left arrow for soutneast bound traffic on Cambridge St. at Relocated Sudbury St.

GOVERNMENT CENTER STUDY

PROPOSED 100 SECOND CYCLE

TRAFFIC CONTROL SIGNAL TIME – SPACE PROGRESSIVE DIAGRAM

FOR PORTLAND ST.



GREEN YELLOW RED

VERTICAL SCALE 1" = 200 Ft.

HORIZONTAL SCALE 1" = 20 Sec.

NOTE:

Zero offset is beginning of right-left arrow for southeast bound traffic on Cambridge St. at Relocated Sudbury St.

PORTLAND - MERRIMAC STREETS

A. - At Chardon Street

Intervals	1	2	3	4	5	6	7	8	9
Seconds	15	32	4	8	4	15	4	15	3
Merrimac St. S.Eb'd	G	G	Y	R	R	R	R	RY	R
Portland St. N.Wb'd	R	G	G	G	Y	R	R	RY	R
Chardon St. N.Wb'd	R	R	R	R-RA	R-RA	G	Y	RY	R
Pedestrians only	R	R	R	R	R	R	R	RY	R

PORTLAND STREET

B. - At Washington Street Connection

Intervals	1	2	3	4	5	6	7	8
Seconds	35	4	20	4	15	4	15	3
Washington St.	LA-RA	Y-RA	R-RA	R-RA	R-RA	Y	RY	R
Portland St. E	R	R	LA-VA	Y-LA	R-LA	Y	RY	R
Portland St. W	R-RA	R-RA	VA-RA	Y-RA	R-RA	Y	RY	R

PORTLAND STREET

C. - At Sudbury Street (relocated)

Intervals	1	2	3	4	5	6	7	8
Seconds	37	4	10	4	23	4	15	3
Portland St. S.Eb'd (At Sudbury St. West)	VA-RA	VA-RA	VA-RA	Y	R	R	RY	R
Portland St. S. Eb'd (At Sudbury St. East)	LA-VA	LA-VA	LA-VA	Y	R	R	RY	R
Portland St. N.Wb'd (At Sudbury St. East)	VA-RA	Y-RA	R-RA	R-RA	R-RA	Y	RY	R
Portland St. N.Wb'd (At Sudbury St. West)	LA-VA	LA-VA	LA-VA	Y	R	R	RY	R
Sudbury St. S.Wb'd	R	R	R	R	G	Y	RY	R
Sudbury St. N. Eb'd	R	R	R	R	G	Y	RY	R
Pedestrians Only	R	R	R	R	R	R	RY	R

PORTLAND STREET

D. - At Hanover Street

Intervals	1	2	3	4	5	6
Seconds	47	4	27	4	15	3
Portland St. S.Eb'd	G	Y	R	R	RY	R
Portland St. N.Wb'd	G	Y	R	R	RY	R
Hanover St. N. Eb'd	R	R	G	Y	RY	R
Hanover St. S. Wb'd	R	R	G	Y	RY	R
Pedestrians Only	R	R	R	R	RY	R

Time-space diagrams follow for both Cambridge Street - Scollay Square and Portland Street to illustrate the possibilities of traffic control signal progression.

Conclusion

The plans presented herewith are of a preliminary nature, based on plans of existing streets and conditions. Prior to construction of the Government Center a detailed topographic survey of the study area should be made for more accurate information on street alignment and grades. Based on the survey, detailed plans and profiles should be prepared for street layout which includes alignment and grades, channelization medians and islands, signals, an overpass, Central Artery ramp changes, curbs and sidewalks.

PUBLIC UTILITIES

The public utilities in the government center which have been relocated as a result of new street alignment are: the water service, which consists of a high pressure water service, a low pressure water service and a high pressure fire service; the sewer system which is combined for both storm water and sanitary sewage; and the fire and police communication system. Private utilities consist of services by the New England Telephone and telegraph Company, the Boston Gas Company, and the Boston Edison Company, the relocation of which is the responsibility of the company concerned.

As the existing street pattern under which the utilities lie has been changed extensively, many utility relocations are required. The location of utility lines has not been changed when the general street alignment remains unchanged, or when the lines are adjacent to subway tunnels which will require easements. When the existing utilities cross proposed land parcels, they have been relocated so as to conform to the proposed street alignment and provide adequate service for the new buildings in the area.

Low Pressure Water Service

Low pressure water service lines under existing streets which will become sites for buildings have been relocated so as to lie under relocated streets. The 30" supply main under Bulfinch Street has been moved to Bowdoin Street and the 24" supply main through

Warren Square has been relocated under Portland Street. The 12" secondary feeders have been relocated under Sudbury Street (relocated), Portland Street (relocated), Washington StreetNorth and Green Street (relocated).

Existing water mains under streets that will become building sites will be abandoned. These lines, if not removed, will have to be plugged at the junction with the feeder still to be used. Due to the age of the pipes to be abandoned, it is improbable that they could be used to advantage in the future or re-used in this project. This would have to be determined by inspection.

There are approximately 33 hydrants of various types in the project area, 18 of which would have to be removed. Replacement of 10 of these on the proposed streets should give adequate fire protection for the areas served by the low pressure water service.

Gates should be placed in the lines so that only a small portion of the system need be shut off at one time for repairs and replacements. The location of gates and hydrants have not been included in the plans.

The relocation of lines in the low pressure water service is shown on the plan titled "Public Utilities Adjustments Plan - Low Pressure Water Service."

High Pressure Water Service

The high pressure water service serves the portion of the project area not served by the low pressure water service and some areas that are served by the low pressure system. The two systems are joined with dividing gates at Sudbury Street, Hanover Street and Adams. Square.

The lines have been relocated as shown on the plan titled "Public Utilities Adjustment Plan - High Pressure Water Service". Lines under streets to be abandoned for building sites have been relocated under the proposed street system. The supply mains under Washington Street and Chardon Street do not have to be relocated. Secondary feeders have been placed under Sudbury Street (relocated), Portland Street (relocated), Green Street (relocated), Washington Street North and the street through Pemberton Square. Lines have been placed so as to tie in with the existing system and form continuous loops so that the lines can feed from either end.

Gates and hydrants have not been located on the plans. There are approximately 18 hydrants in the project area, 10 of which will have to be relocated to conform with the proposed street pattern. Gates should be placed in the manner mentioned for the low pressure water service.

High Pressure Fire Service

The high pressure fire service is an independent system that affords additional fire protection through a large portion of the project area. It is used in conjunction with the high and low pressure

water services for fire fighting purposes. The plan titled "Public Utilities Adjustments Plan - High Pressure Fire Service" shows the location and relocation of lines in this system. As in the high and low pressure services, the lines under streets to be abandoned have been relocated under the proposed streets. The proposed location of lines are under Portland Street (relocated), Sudbury Street (relocated), Chardon Street, and under the City Hall Plaza. The latter was so placed to avoid the Scollay Subway Station and yet tie in with existing lines. Lines under the proposed land parcels should be abandoned or re-used if their condition permits.

In the project area there are approximately 51 hydrants, 32 of which must be removed. With 19 of the existing hydrants remaining and 20 hydrants relocated, the high pressure fire system will conform with the proposed street pattern.

Location of gates and hydrants are not shown on the plan. As in the high and low pressure water services, placement of these should conform with good engineering practice so as to serve their purpose adequately.

Fire Alarm System

The fire alarm system is located in one conduit of the New England Telephone and Telegraph Company. In most cases single conduit carries the cable from the telephone manholes to the fire alarm boxes. The relocation of fire alarm lines as shown on the plan titled "Fire and Police Communications Plan" does not conform to existing telephone

lines and has been relocated independent of telephone lines. When the relocation of telephone company lines has been established, the fire alarm lines should be adjusted to conform with them so as to alleviate the necessity of laying an individual conduit for the fire alarm system.

The fire alarm lines have been relocated under Washington Street North, Portland Street (relocated), Sudbury Street (relocated), through Dock Square, under Blackstone Street and under portions of Somerset Street and Cambridge Street.

Fire alarm boxes have been relocated in accordance with proposed street alignment, giving adequate fire alarm protection throughout the government center area. The adjustments mentioned appear on the Fire and Police Communications Plan.

The relocation of the fire house on the corner of Cambridge Street and Bullfinch Street to another site, probably within the project boundary, is considered beyond the scope of this report and has not been included in the plans.

Police Telephone System

As in the fire alarm system, the existing police telephone cable is placed in the conduit of the New England Telephone and Telegraph Company reserved for this purpose. The relocation of police cables and boxes as shown on the plan titled "Fire and Police Communications Plan" has been independent of telephone conduit and should be adjusted to the telephone conduit when plans are available. The police

lines have been relocated as necessary to conform with proposed street alignment, removing cables under streets that will be abandoned to become land parcels for building sites. They have been relocated under Portland Street (relocated) connected with Congress Street, Dock Square, Blackstone Street, Sudbury Street (relocated), Haymarket Square, Green Street (relocated) and a portion of Cambridge Street.

Police telephone boxes have been relocated to afford ample coverage through the project area, based on proposed street alignments.

Sewerage System

In the project area, both the sanitary sewage and the storm water flow into the combined sewers, many of which were constructed more than sixty years ago. Prior to the construction of the sewers which have been relocated as shown on the plan titled "Public Utility Adjustments Plan - Sewerage System", an inspection should be made of the existing sewers to be retained within the project boundary to ascer= tain whether their condition predicates replacement at the time the government center is under construction.

The relocation of sewers under Portland Street (relocated), Sudbury Street (relocated), Washington Street North, Green Street (relocated), the street through Pemberton Square and Dock Square was accomplished in a manner so as to adequately handle a 15 year rainfall and at the same time conform as nearly as possible with the existing sewer system. Sewers under proposed land parcels for building sites should be abandoned with the exception of the sewers following subway tunnel.

Manholes have been relocated, as have the sewer lines, to conform with the proposed street alignment. The invert elevations in the manholes have not been shown. These would depend on avoiding existing utility lines as well as maintaining the necessary slope for adequate flow in all sections of the sewer system at all times.

Utility Easements

Easements for utility lines will be required where existing utility lines have not been removed from proposed land parcels. These lines were not relocated either because they were located next to subway tunnels which will remain or the utilities were so numerous in the particular location that the cost of relocation could not justify their being moved, such as under the intersection of the existing Chardon Street and Hawkins Street. The lines that will require easements have been identified on the plans of the respective utilities.

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SUBWAY FACILITIES

The Government Center area is fortunate in being served by three subways of the Metropolitan Transit Authority. The Main Line, running from Everett to Forest Hills virtually bisects the area under Washington Street in a north-south direction. It has station stops at Friend-Union and at State-Milk within or adjacent to the area. The East Boston Tunnel, running from Bowdoin Square to Revere passes through the area via Cambridge Street, Scollay Square, Court and State Streets. Stations are conveniently located at Devonshire, Scollay and Bowdoin. The Tremont Street subway passes under Tremont, Cornhill and Washington Streets northbound and under Washington, Hanover, Scollay Square and Tremont Streets southbound. Stations are located at Scollay, Adams, and Haymarket squares. This subway serves surface cars from Brighton, Brookline, Roxbury and the South End, and connects with cars from Newton, Watertown and Forest Hills.

The only rapid transit line which does not serve the area is the Cambridge-Dorchester subway. However, adequate transfer points are located between this line and both the Washington Street and Tremont Street subways.

In addition the area is also served by suburban busses of the Eastern Massachusetts Street Railway terminating at Haymarket Square. It is proposed to relocate this terminal to the vicinity of Hanover and Union Streets.

Because of the inadequate capacity of the existing Tremont Street subway between the Park and Scollay stations, plans have been

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In addition the area is also served by suburban busses of the Eastern Massachusetts Street Railway terminating at Haymarket Square. It is proposed to relocate this terminal to the vicinity of Hanover and Union Streets.

Because of the inadequate capacity of the existing Tremont Street subway between the Park and Scollay stations, plans have been

developed in recent years for the provision of two additional tracks between these stations by means of a new twin-tube tunnel running from Hanover Street to Park Street via Pemberton Square. These plans include the construction of a new southbound Scollay Station and extensive improvements and enlargements to the existing northbound Scollay station. We have thoroughly reviewed these plans and find that they are readily adaptable to the proposed street and land use pattern of the Government Center. What modifications will be required can best be developed at the time of preparation of contract plans.

It is in light of the above, that we itemize those changes which will be required in the existing facilities, because of physical or architectural considerations.

Scollay and Scollay Under

The relocation of Cambridge Street will make it necessary to abandon the existing stairway exit and escalator exit located in the island near Brattle Street. Because of the inconvenience which will be caused to patrons of the East Boston line, it is recommended that a new escalator from the lower to upper level be substituted in the existing escalator well.

Demolition of the building on the corner of Brattle Street will make it necessary to remove the now abandoned stairway leading from the Brattle Street Loop.

No changes will be required to the main entrance to the station. Surface changes will mean that it will be located in the new City Hall Plaza rather than on an island in the roadway as at present.

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It is in light of the above, that we itemize those changes which will be required in the existing facilities, because of physical or architectural considerations.

<u>Scollay and Scollay Under</u>

The relocation of Cambridge Street will make it necessary to abandon the existing stairway exit and escalator exit located in the island near Brattle Street. Because of the inconvenience which will be caused to patrons of the East Boston line, it is recommended that a new escalator from the lower to upper level be substituted in the existing escalator well.

Demolition of the building on the corner of Brattle Street will make it necessary to remove the now abandoned stairway leading from the Brattle Street Loop.

No changes will be required to the main entrance to the station. Surface changes will mean that it will be located in the new City Hall Plaza rather than on an island in the roadway as at present.

At the same time the stairway to an abandoned platform should be sealed off as it serves no useful junction.

In conjunction with the future twin tubes, it has been proposed to construct a new loop in the vicinity of Washington and Hanover Streets. Such a loop would, in effect, make Adams Station available to southbound riders and thus greatly increase its use. In this event, provision should be made for a new entrance at the north end of a lengthened platform.

Haymarket

The construction of New Sudbury Street will force the removal of the south-easterly stairway to the surface. No other physical changes are necessary at this station.

The construction of the overpass on New Sudbury Street will create a barrier for some people wishing to use this station. However, they will be able to enter the Union-Friend Station and cross under the street.

Union-Friend

Demolition of buildings above the lobby of this station may well require a replacement of portions of the lobby, the roof of which is approximately at street level. However, until plans for the use of this site are further advanced, it is impossible to define the nature of such replacement or the treatment to be accorded the two stairways to the surface.

No changes to existing stairways between the upper and lower levels will be required.

It has been proposed by the planning consultants that the main entrance be removed and a new circular stairwell be constructed. Such an entrance would require enlarging the station and relocating the Brattle Loop. It is not to be anticipated that the Metropolitan Transit Authority could justify such an expenditure at this time. However, in the event that other financing should be forthcoming, we have reviewed the plan and find it feasible. Although plans for the new Scollay Stations contemplate the removal of an entrance in this location, we believe that the construction of this stairwell would not adversely affect future plans.

Because of inadequate track and platform capacity, no relief can be provided for the additional passenger loads which will be thrown upon this station until such time as the twin tubes and new stations are constructed.

Adams

Under the proposed street alignment, Adams Station will be located on New Congress Street at the easterly side of City Hall Plaza. Its function as a northbound-only station reduces its effectiveness, and, for that reason, it should be able to handle the demands of a new City Hall.

The existing entrance and exit should receive appropriate architectural treatment to harmonize with its new surroundings.

State-Milk-Devonshire

Although this station is outside the area and will require no physical changes, it should be pointed out that the Federal Building will add greatly to the already heavy volumes served by these stations. If future redevelopment should occur across Washington Street, opportunity might occur to provide an additional entrance and exit. The present entrances and exits most convenient to the Federal Office Building site are located in the Old State House at State Street and Devonshire Street and by the Old South Meeting House on Washington Street near Milk Street.

ESTIMATES OF COST

The estimates of cost for street improvements and public utilities are based on preliminary design of the structures involved. The actual cost of construction will vary considerably, depending principally on the portions of the project involved in each phase of redevelopment, traffic conditions throughout the construction period and the varying cost of construction as the project develops.

The cost of land acquisition and demolition has not been included in these estimates.

The cost estimates for street improvements include the streets at grade, the overpass on Sudbury Street, the proposed ramp connecting southbound Central Artery traffic with the overpass on Sudbury Street, the ramp addition to the Central Artery at North Street and the traffic control signal system.

The estimates of cost for public utilities include the water services, the sewerage system and the police and fire communications systems. In the case of the latter the cost will vary considerably, depending on the use of Telephone and Telegraph Company conduit and manholes for interconnecting cable. The proposed fire and police communication lines should be adjusted to conform with the telephone conduit so as to eliminate the construction cost of separate conduit and manholes. A deductible item has been included in the detailed estimate for this contingency.

SUMMARY OF ESTIMATES OF COST FOR STREET IMPROVEMENTS

Streets at Grade	$ 967,850
Overpass on Sudbury Street	427,765
Ramp Addition from North Street to Central Artery Southbound	92,700
New Ramp - Central Artery Southbound . To Sudbury Street Overpass	983,800
Traffic Control Signal System	70,000
Total -	$2,542,115

ESTIMATE OF COST - STREETS AT GRADE

Street	Item	Quantity	Unit Price	Sub-Total	Total
Cambridge - Staniford to Chardon	Paving	610 s.y.	$ 6.00	$ 3,650	
	Re-surface	2430 s.y.	2.50	6,100	
	Sidewalks	490 s.y.	5.00	2,450	
	Curb	440 l.f.	4.00	1,760	
	Median	130 l.f.	10.00	1,300	
	Inlets	2 ea.	400.00	800	$16,060
Cambridge - Chardon to Sudbury	Paving	3750 s.y.	6.00	22,500	
	Sidewalks	870 s.y.	5.00	4,350	
	Curb	550 l.f.	4.00	2,200	
	Median	300 l.f.	10.00	3,000	
	Inlets	3 ea.	400.00	1,200	
	Fill	3000 c.y.	4.00	12,000	45,250
Cambridge - Sudbury to Hanover	Paving	2500 s.y.	6.00	15,600	
	Sidewalks	1445 s.y.	5.00	7,225	
	Curbs	635 l.f.	4.00	2,525	
	Medians	285 l.f.	10.00	2,850	
	Inlets	2 ea.	400.00	800	
	Fill	3700 c.y.	4.00	14,800	43,800
Cambridge - Hanover to Court	Paving	2800 s.y.	6.00	16,900	
	Sidewalks	1600 s.y.	5.00	8,000	
	Curbs	650 l.f.	4.00	2,600	
	Medians	330 l.f.	10.00	3,300	
	Inlets	2 ea.	400.00	800	
	Fill	280 c.y.	4.00	1,100	32,700
Tremont - Court Beacon	Paving	1600 s.y.	6.00	9,600	
	Sidewalks	1540 s.y.	5.00	7,700	
	Curbs	770 l.f.	4.00	3,100	
	Inlets	2 ea.	400.00	800	21,200

Street	Item	Quantity	Unit Price	Sub-Total	Total
Pemberton Sq. - Somerset	Paving	4140 s.y.	$ 6.00	$ 25,000	
to Somerset	Sidewalks	2880 s.y.	5.00	14,400	
	Curb	1600 l.f.	4.00	6,400	
	Inlets	6 ea.	400.00	2,400	
	Fill	5600 c.y.	4.00	22,400	$70,600
Court - Tremont	Paving	830 s.y.	6.00	5,000	
to Project Boundary	Sidewalks	480 s.y.	5.00	2,400	
	Curb	400 l.f.	4.00	1,600	
	Inlets	1 ea.	400.00	400	9,400
Hanover - Cambridge	Paving	2520 s.y.	6.00	15,200	
to Portland	Sidewalks	1260 s.y.	5.00	6,300	
	Curbs	1120 l.f.	4.00	4,480	
	Inlets	4 ea.	400.00	1,600	
	Fill	6400 c.y.	4.00	25,500	
	Subway Support	300 l.f.	100.00	30,000	83,080
Hanover - Portland	Paving	1850 s.y.	6.00	1,100	
to Blackstone	Sidewalks	670 s.y.	5.00	3,350	
	Curbs	570 l.f.	4.00	2,280	16,730
Blackstone - Sudbury	Paving	4950 s.y.	6.00	29,800	
to North	Sidewalks	345 s.y.	5.00	1,700	
	Curb	1120 l.f.	4.00	4,480	
	Median	400 l.f.	9.00	3,600	
	Fence	710 l.f.	5.00	3,550	43,130
Devonshire - Project	Paving	680 s.y.	6.00	4,100	
Boundary to Adams Sq.	Sidewalks	223 s.y.	5.00	1,100	5,200
Congress - State	Re-Surface	1340 s.y.	2.50	3,350	
to Adams Sq.	Sidewalks	335 s.y.	5.00	1,700	5,050

Street	Item	Quantity	Unit Price	Sub-Total	Total
Devonshire - Adams Sq. to Hanover	Paving	2140 s.y.	$ 6.00	$13,100	
	Sidewalks	670 s.y.	5.00	3,350	
	Curb	590 l.f.	4.00	2,350	
	Median	600 l.f.	12.00	7,200	
	Inlets	2 ea.	400.00	800	
	Fill	1850 c.y.	4.00	7,400	$34,200
Congress - Adams Sq. to Hanover	Paving	2440 s.y.	6.00	14,600	
	Sidewalks	680 s.y.	5.00	3,400	
	Curb	620 l.f.	4.00	2,500	
	Inlets	2 ea.	400.00	800	
	Fill	4300 c.y.	4.00	17,000	38,300
Portland - Hanover to Sudbury	Paving	3040 s.y.	6.00	18,000	
	Sidewalks	650 s.y.	5.00	3,250	
	Curb	580 l.f.	4.00	2,300	
	Median	330 l.f.	10.00	3,300	
	Inlets	2 ea.	400.00	800	27,650
Portland - crossing Sudbury	Paving	1000 s.y.	6.00	6,000	
	Sidewalks	115 s.y.	5.00	540	
	Curb	120 l.f.	4.00	480	
	Inlets	2 ea.	400.00	800	7,820
Portland - Sudbury to Chardon	Paving	3620 s.y.	6.00	21,800	
	Sidewalks	980 s.y.	5.00	4,900	
	Curbs	850 l.f.	4.00	3,400	
	Medians	350 l.f.	10.00	3,500	
	Inlets	3 ea.	400.00	1,200	34,800
Merrimac - Chardon to Traverse	Re-Surface	850 s.y.	2.50	2,130	
	Sidewalk	375 s.y.	5.00	1,860	
	Curb	340 l.f.	4.00	1,360	
	Inlet	1 ea.	400.00	400	5,750
Portland - Chardon to Traverse	Pavement	420 s.y.	6.00	2,500	
	Sidewalk	155 s.y.	5.00	780	
	Curb	140 l.f.	4.00	560	3,840

Sudbury - Cambridge to Portland (except overpass)	Pavement	6460 s.y.	6.00	$39,000	
	Sidewalks	1500 s.y.	5.00	7,500	
	Curbs	2250 l.f.	4.00	9,000	
	Medians	570 l.f.	10.00	5,700	
	Inlets	6 ea.	400.00	2,400	$63,600
Sudbury - Portland to Central	Pavement	4000 s.y.	6.00	24,000	
	Sidewalks	1260 s.y.	5.00	6,300	
	Curbs	2360 l.f	4.00	9,500	
	Inlets	8 ea.	400.00	3,200	43,000
Washington North - Portland to A.A. Ramp	Pavement	4930 s.y.	6.00	29,600	
	Sidewalks	1080 s.y.	5.00	5,400	
	Curbs	970 l.f.	4.00	3,900	
	Medians	550 l.f.	10.00	5,500	
	Inlets	4 ea.	400.00	1,600	
	Fill	100 c.y.	4.00	400	46,400
Chardon - Cambridge to Merrimac	Pavement	3550 s.y.	6.00	21,400	
	Sidewalks	1740 s.y.	5.00	8,750	
	Curbs	1560 l.f.	4.00	6,300	
	Inlets	2 ea.	400.00	800	37,250
Green - Staniford to Chardon	Pavement	2760 s.y.	6.00	16,600	
	Sidewalks	1380 s.y.	5.00	6,900	
	Curbs	1240 l.f.	4.00	5,000	
	Inlets	4 ea.	400.00	1,600	
	Fill	100 c.y.	4.00	400	30,500
Merrimac - Staniford to Traverse	Re-Surface	900 s.y.	2.50	2,250	
	Sidewalk	600 s.y.	5.00	3,000	5,250
Union - Hanover to Dock Sq.	Pavement	1960 s.y.	6.00	11,800	
	Sidewalk	1000 s.y.	5.00	5,000	
	Curb	880 l.f.	4.00	3,500	
	Inlets	2 ea.	400.00	800	21,100
					791,600
Maint. of Traffic	Lump Sum				50,000
				Total	841,600
	15% Eng. & Contingencies				126,250
				Grand Total	$967,850

ESTIMATE OF COST

OVERPASS ON SUDBURY STREET (Relocated)

Item	Quantity	Unit Price	Sub Total	Total
Concrete - Retaining Walls	1520 c.y.	$ 22.00	$ 33,440	
Concrete - Slab	1790 c.y.	28.00	50,120	
Concrete - Foundations	930 c.y.	22.00	20,460	
Forms - Retaining Walls	55,000 s.f.	1.50	82,500	
Forms - Slab	8,780 s.f	1.50	13,200	
Forms - Foundations	7,300 s.f.	1.50	10,950	
Reinforcing	153 T	300.00	45,900	
Gravel Fill	6,000 s.y.	4.00	24,000	
Struct. Steel	75 T	320.00	24,000	
Paving	1,600 s.y.	2.50	4,000	
Piles	3,600 l.f.	10.00	36,000	
Exc. & Backfill	3,000 c.y.	4.00	12,000	
Drainage - Inlets	9 ea.	600.00	5,400	
Maint. of Traffic	L.S.		10,000	$ 371,970
15% Contingencies & Eng.				55,795
			Grand Total -	$ 427,765

RAMP ADDITION FROM NORTH STREET TO CENTRAL ARTERY SOUTHBOUND

Concrete - Retaining Wall	250 c.y.	22.00	5,500	
Concrete - Foundations	215 c.y.	22.00	4,730	
Concrete - Slab	230 c.y.	28.00	6,440	
Forms - Retaining Wall	9600 s.f.	1.50	14,400	
Forms - Foundations	2880 s.f.	1.50	4,320	
Forms - Slab	480 s.f.	1.50	720	
Forms - Ext. Curb	1440 s.f.	1.50	2,160	
Reinforcing	30.6 T	300.00	9,180	
Gravel Fill	1250 c.y.	4.00	5,000	
Paving	380 s.y.	2.50	950	
Remove Portion Exist. Ramp	140 l.f.	100.00	14,000	
Exc. & Backfill	700 c.y.	10.00	7,000	
Drainage - Inlets	2 ea.	600.00	1,200	
Maint. of Traffic	L.S.		5,000	$ 80,600
15% Contingencies & Eng.				12,100
			Grand Total -	92,700

ESTIMATE OF COST

NEW RAMP - CENTRAL ARTERY SOUTHBOUND TO SUDBURY STREET OVERPASS

Item	Quantity	Unit Price	Sub Total	Total
Sections built on solid ground	9 Sect.	40,165	$361,500	
Section joining existing ramp				
Rev. to existing ramp	290 l.f.	100	29,000	
	290 l.f.	500	145,000	
Section over Subway				
Temp. Removal of Subway street	8 Footings	500	4,000	
Temp. Bracing of Subway street	8 "	500	4,000	
Replace Subway street	8 "	1000	8,000	
Const. of Ramp	340 l.f.	500	170,000	
Section joining overpass				
Conn. Ramp to overpass	125 l.f.	50	6,250	
Const. of Ramp	125 l.f.	500	62,500	
Drainage - Inlets	12 ea.	600	7,200	
Maintenance of Traffic	L.S.		50,000	
Maintenance of Utilities under Haverhill St.	16 Footings	500	8,000	$855,450
		15% Contingencies & Eng.		128,350
			Grand Total -	$983,800

BREAKDOWN OF 80' SECTION OF RAMP

Concrete - Slab	100 c.y	28.00	2,800	
Concrete - Foundations	30 c.y	22.00	660	
Forms - Slab	4000 s.f.	1.50	6,000	
Forms - Foundations	320 s.f.	1.50	480	
Reinforcing	9.35 T	300.00	2,800	
Paving	250 s.y.	2.50	625	
Railing	160 l.f.	6.00	1,000	
Piles	1000 l.f.	10.00	10,000	
Exc. & Backfill	80 c.y.	10.00	800	
Struct. Steel	45 T	320.00	15,000	$ 40,165

$40,165 per 80' Section or $500. / lin. ft.

ESTIMATE OF COST - TRAFFIC CONTROL SIGNAL SYSTEM

Streets	Item	Quantity	Unit Price	Sub-Total	Total
Cambridge & Bowdoin	3" Conduit	300 L.F.	$ 6.00	$1800	$
	Post & Base	5 each	120.00	600	
	3 Lens Housings	5 each	90.00	450	
	4 Lens Housings	5 each	110.00	550	
	Local Controller	1 each	1000.00	1000	
	Cable	335 L.F.	1.30	435.50	4,835
Cambridge & Sudbury	3" Conduit	670 L.F.	6.00	4020	
	Post & Base	13 each	120.00	1560	
	3 Lens Housings	8 each	90.00	720	
	4 Lens Housings	7 each	110.00	770	
	5 Lens Housings	3 each	130.00	390	
	Local Controller	1 each	1000.00	1000	
	Cable	715 L.F.	1.30	929.50	9,390
Cambridge & Hanover	3" Conduit	300 L.F.	6.00	1800	
	Post & Base	6 each	120.00	720	
	3 Lens Housings	3 each	90.00	270	
	4 Lens Housings	8 each	110.00	880	
	Local Controller	1 each	1000.00	1000	
	Cable	335 L.F.	1.30	435.50	5,105
Cambridge & Court	3" Conduit	240 L.F.	6.00	1440	
	Post & Base	6 each	120.00	720	
	3 Lens Housings	8 each	90.00	720	
	4 Lens Housings	1 each	110.00	110	
	Local Controller	1 each	1000	1000	
	Cable	275 L.F.	1.30	357.50	4,350
Portland & Chardon	3" Conduit	240 L.F.	6.00	1440	
	Post & Base	5 each	120.00	600	
	3 Lens Housings	6 each	90.00	540	
	4 Lens Housings	2 each	110.00	220	
	Local Controller	1 each	1000.00	1000	
	Cable	275 L.F.	1.30	357.50	4,160
Portland & Washington N.	3" Conduit	300 L.F.	6.00	1800	
	Post & Base	7 each	120.00	840	
	3 Lens Housings	6 each	90.00	540	
	4 Lens Housings	4 each	110.00	440	
	Local Controller	1 each	1000.00	1000	
	Cable	335 L.F.	1.30	435.50	5,055
Portland & Sudbury	3" Conduit	600 L.F.	6.00	3600	
	Post & Base	12 each	120.00	1440	
	3 Lens Housings	8 each	90.00	730	
	4 Lens Housings	7 each	110.00	770	
	Local Controller	1	1000.00	1000	
	Cable	640 L.F.	1.30	832	8,365

Streets	Item	Quantity	Unit Price	Sub-Total	Total
Portland & Hanover	3" Conduit	350 L.F.	6.00	$2100.00	$
	Post & Base	6 each	120.00	720.00	
	3 Lens Housings	11 each	90.00	990.00	
	Local Controller	1 each	1000.00	1000.00	
	Cable	390 L.F.	1.30	507.00	5,320
Portland & Cambridge	Cable-Inter.	3300 L.F.	1.30	4290.	4,290
	Master Panel Installed	L.S.	10,000	10,000	10,000
				Total -	$ 60,870
				15% Engineering & Contingencies -	9,130
				Grand Total -	$ 70,000

SUMMARY OF ESTIMATES OF COST FOR PUBLIC UTILITIES

Low Pressure Water Service	$125,400.00
High Pressure Water Service	101,820.00
High Pressure Fire Service	103,250.00
Sewerage System	122,355.00
Fire Alarm System	82,945.00
Police Telephone System	52,940.00
Total - -	$588,710.00

ESTIMATE OF COST - LOW PRESSURE WATER SERVICE

Street	Item	Quantity	Unit Price	Total
Bowdoin	30" C. I.	425 L.F.	$48.00	$20,400
Chardon	30" C. I.	290 L.F.	48.00	13,920
Green (relocated)	12" C.I.	690 L.F.	16.50	11,385
Portland	12" C.I.	610 L.F.	16.50	10,065
	24" C.I.	360 L.F.	39.50	14,220
Washington North	12" C.I.	285 L.F.	16.50	4,705
Sudbury (relocated)	12" C.I.	370 L.F.	16.50	6,105
Blackstone	12" C.I.	535 L.F.	16.50	8,830
Dock Square	12" C.I.	275 L.F.	16.50	4,540
	24" C.I.	250 L.F.	39.50	9,875
Allowance for plugging or removal of existing lines				3,000
			Total -	$ 109,045
			15% Engineering and Contingencies -	16,355
			Grand Total -	$ 125,400

ESTIMATE OF COST - HIGH PRESSURE WATER SERVICE

Street	Item	Quantity	Unit Price	Total
Pemberton Square	8" C.I.	535 L.F.	$12.00	$ 6,420
Somerset	12" C.I.	125 L.F.	16.50	2,065
Green (relocated)	12" C.I.	710 L.F.	16.50	11,715
Portland	12" C.I.	815 L.F.	16.50	13,450
Washington North	12" C.I.	355 L.F.	16.50	5,860
Sudbury	8" C.I.	1465 L.F.	12.00	17,580
Blackstone	12" C.I.	395 L.F.	16.50	6,520
Hanover	12" C.I.	130 L.F.	16.50	2,145
Staniford	12" C.I.	315 L.F.	16.50	5,200
Merrimac	12" C.I.	250 L.F.	16.50	4,125
Congress	8" C.I.	600 L.F.	12.00	7,200
Adams Square	8" C.I.	105 L.F.	12.00	1,260
Allowance for plugging and removal of existing lines				5,000
			Total -	$ 88,540
			15% Engineering and Contingencies -	13,280
			Grand Total -	$ 101,820

ESTIMATE OF COST - HIGH PRESSURE FIRE SERVICE

Street	Item	Quantity	Unit Price	Total
City Hall Plaza	16" C. I.	675 L. F.	$25.00	$16,875
Somerset	16" C.I.	250 L.F.	25.00	6,250
Chardon & Cambridge	12" C.I.	525 L.F.	16.50	8,665
Sudbury	16" C.I.	705 L.F.	25.00	17,625
Washington North	16" C.I.	100 L.F.	25.00	2,500
Portland	16" C.I.	955 L.F.	25.00	23,875
Hanover	12" C.I.	210 L.F.	16.50	3,465
Dock Square	12" C.I.	335 L.F.	16.50	5,530
Allowance for plugging or removal of existing lines				5,000
			Total -	$ 89,785
			15% Engineering & Contingencies-	13,470
			Grand Total -	$103,250

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ESTIMATE OF COST - SEWERAGE SYSTEM

Street	Item	Quantity	Unit Price	Sub-Total	Total
Pemberton Square	15" R.C.P.	615 L.F.	11.00	$ 6,765	$
	M. H.	3 each	500.00	1,500	8,265
Somerset	18" R.C.P.	150 L.F.	12.25	1,837.50	
	M. H.	1 each	500.00	500.00	2,340
Cambridge	18" R.C.P.	165 L.F.	12.25	2,021.25	2,020
Green (relocated	15" R.C.P.	295 L.F.	11.00	3,245	
	18" R.C.P.	300 L.F.	12.25	3,675	
	M. H.	2 each	500.00	1,000	7,920
Chardon	18" R.C.P.	190 L.F.	12.25	2,327.50	
	M. H.	1 each	500.00	500.00	2,830
Portland	15" R.C.P.	420 L.F.	11.00	4,620.	
	30" R.C.P.	440 L.F.	17.00	7,480	
	36" R.C.P.	595 L.F.	20.00	11,900	
	M. H.	10 each	500.00	5,000	29,000
Hanover	15" R.C.P.	125 L.F.	11.00	1,375	
	30" R.C.P.	95 L.F.	17.00	1,615	2,990
Friend	21" R.C.P.	140 L.F.	13.50	1,890	
	36" R.C.P.	170 L.F.	20.00	3,400	
	M. H.	1 each	500.00	500	5,790
Washington North	15" R.C.P.	170 L.F.	11.00	1,870	
	21" R.C.P.	150 L.F.	13.50	2,025	
	36" R.C.P.	95 L.F.	20.00	1,900	
	M. H.	4 each	500.00	2,000	7,795
Sudbury	15" R.C.P.	660 L.F.	11.00	7,260	
	24" R.C.P.	325 L.F.	14.75	4,793.75	
	30" R.C.P.	450 L.F.	17.00	7,650	
	M. H.	7 each	500.00	3,500.	23,205
Congress	30" R.C.P.	220 L.F.	17.00	3,740	
	M. H.	1 each	500.00	500	4,240
Allowance for plugging and removal of abandoned lines				10,000	10,000
				Total -	106,395
			15% Engineering & Contingencies		15,960
				Grand Total -	122,355

ESTIMATE OF COST - FIRE ALARM SYSTEM

Street	Item	Quantity	Unit Price	Sub-Total	Total
Cambridge & Bowdoin	Conduit	70 L.F.	7.00	490.	
	Cable	80 L.F.	1.75	140.	
	Box	1 each	500.	500.	$1,130
Cambridge & Chardon	Conduit	40 L.F.	7.00	280.	
	Cable	50 L.F.	1.75	87.50	
	Cable-Inter.	180 L.F.	1.75	315.	
	Box	1 each	500.	500.	1,185
Cambridge & Somerset	Conduit	40 L.F.	7.00	280.	
	Cable	50 L.F.	1.75	87.50	
	Box	1 each	500.	500.	870
Cambridge & Sudbury	Conduit	120 L.F.	7.00	840.	
	Cable	130 L.F.	1.75	227.50	
	Box	1 each	500.	500.	1,570
Cambridge & Pemberton Square	Conduit	380 L.F.	7.00	2660.	
	Cable	390 L.F.	1.75	682.50	
	Box	1 each	500.	500.	4,345
Tremont & Court	Conduit	45 L.F.	7.00	315.	
	Cable	55 L.F.	1.75	96.25	
	Box	1 each	500.	500.	910
Somerset	Conduit	40 L.F.	7.00	280.	
	Cable	50 L.F.	1.75	87.50	
	Cable-Inter.	350 L.F.	1.75	612.50	
	Box	1 each	500.	500.	1,480
State & Congress	Conduit	30 L.F.	7.00	210.	
	Cable	40 L.F.	1.75	70.	
	Box	1 each	500.	500.	780

Street	Item	Quantity	Unit Price	Sub-Total	Total
Devonshire at Adams Square	Conduit	50 L.F.	7.00	350.	
	Cable	60 L.F.	1.75	105.	
	Box	1 each	500.	500.	
	Test Post.	L. S.		1000.	1,955
Cambridge- Congress	Cable-Inter.	1500 L.F.	1.75	2625.	2,625
Congress - East Side	Conduit	20 L.F.	7.00	140.	
	Cable	30 L.F.	1.75	52.50	
	Box	1 each	500.	500.	695
Dock Square	Cable-Inter.	335 L.F.	1.75	586.25	590
Union at Dock Square	Conduit	65 L.F.	7.00	455.	
	Cable	75 L.F.	1.75	131.25	
	Box	1 each	500.	500.	1,085
Devonshire & Hanover	Conduit	60 L.F.	7.00	420.	
	Cable	70 L.F.	1.75	122.50	
	Box	1 each	500.	500.	1,045
Portland & Sudbury	Conduit	100 L.F.	7.00	700.	
	Cable	120 L.F.	1.75	210.	
	Box	2 each	500.	1000.	1,910
Portland & Chardon	Conduit	70 L.F.	7.00	490.	
	Cable	80 L.F.	1.75	140.	
	Box	1 each	500.	500.	1,130
Hanover & Union	Conduit	60 L.F.	7.00	420.	
	Cable	70 L.F.	1.75	122.50	
	Cable-Inter.	450 L.F.	1.75	787.50	
	Box	1 each	500.	500.	1,830
Blackstone	Conduit	50 L.F.	7.00	350.	
	Cable	60 L.F.	1.75	105.	
	Cable-Inter.	440 L.F.	1.75	770.	
	Box	1 each	500.	500.	1,725

Street	Item	Quantity	Unit Price	Sub-Total	Total
Sudbury (relocated)	Conduit	30 L.F.	7.00	210.	
	Cable	40 L.F.	1.75	70.	
	Cable-Inter.	880 L.F.	1.75	1540.	
	Box & Post	1 each	500.	500.	2,320
Washington North	Cable-Inter.	400 L.F.	1.75	700.	700
* Government Center -	Interconnecting conduit	4535 L.F.	7.00	31,745	31,745
* Government Center -	Manhole	11 each	500.	5.500	5,500
Contingency for Removal of Existing Lines and Boxes					5,000
				Total -	72,125
				15% Engineering & Contingencies -	10,820
				Grand Total -	82,945

* To be deducted if Telephone Company conduit is used for interconnecting cables.

ESTIMATE OF COST - POLICE TELEPHONE SYSTEM

Street	Item	Quantity	Unit Price	Sub-Total	Total
Cambridge & Staniford	Conduit	50 L.F.	7.00	$350	$
	Cable	60 L.F.	1.75	105	
	Box	1 each	400.00	400	855
Cambridge at Chardon	Cable-Inter.	180 L.F.	1.75	315	315
Cambridge & Somerset	Conduit	30 L.F.	7.00	210	
	Cable	40 L.F.	1.75	70	
	Box	1 each	400.00	400	680
Cambridge to Pemberton Square	Conduit	200 L.F.	7.00	1400	
	Cable	210 L.F.	1.75	368	
	Box	1 each	400.00	400	2168
Tremont & Court	Conduit	50 L.F.	7.00	350	
	Cable	10 L.F.	1.75	18	
	Box	1 each	400.00	400	768
Devonshire at Adams Square	Conduit	50 L.F.	7.00	350	
	Cable	60 L.F.	1.75	105	
	Box	1 each	400.00	400	855
Dock Square	Cable-Inter.	280 L.F.	1.75	490	490
Union at Dock Sq.	Conduit	60 L.F.	7.00	420	
	Cable	70 L.F.	1.75	123	
	Box	1 each	400.00	400	943
Congress & Portland	Cable-Inter.	1510 L.F.	1.75	2643	2643
Devonshire & Hanover	Conduit	70 L.F.	7.00	490	
	Cable	80 L.F.	1.75	140	
	Box	1 each	400.00	400	1030
Portland & Sudbury	Conduit	50 L.F.	7.00	350	
	Cable	60 L.F.	1.75	105	
	Box	1 each	400.00	400	855
Washington North & Haymarket Square	Cable-Inter.	390 L.F.	1.75	683	683
Blackstone	Cable-Inter.	440 L.F.	1.75	770	
	Conduit	70 L.F.	7.00	490	
	Cable	80 L.F.	1.75	140	
	Box	1 each	400.00	400	2000

Street		Quantity	Unit Price	Sub-Total	Total
Green (relocated)	Cable-Inter.	740 L.F.	1.75	$1295	$
	Conduit	30 L.F.	7.00	210	
	Cable	40 L.F.	1.75	70	
	Box	1 each	400.	400	1975
Contingency for Removal of Existing Lines and bores		L.S.	5000	5000	5000
*Conduit for Interconnecting Cable		340 L.F.	7.00	24,780	24,780
				Total -	$ 46,040
				15% Engineering & Contingencies -	6,900
				Grand Total -	$ 52,940

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* If conduit is supplied by Telephone Company, this item may be deducted.

ESTIMATE OF COST - SUBWAY ALTERATIONS

Scollay	
Remove Existing Escalator & Stairs from Scollay Under to Surface	$ 8,500
Provide Escalator Scollay Under to Scollay Platform in Existing Escalator Well	65,000
Replace Subway Structure at Surface where Excalator and Stairs Removed	4,500
Adams	
Remove Stairs to Abandoned Platform	3,000
Replace Subway Structure at Surface	2,500
Union - Friend	
Alterations to Lobby upon Demolition of Buildings	10,000
Haymarket	
Remove Southeast Stairway	2,500
Replace Subway Structure at Surface	3,500
Total -	$ 99,500
15% Engineering & Contingencies -	14,925
Grand Total -	$114,425

ESTIMATE OF COST - SUBWAY ALTERATIONS

Scollay

Remove Existing Escalator & Stairs from Scollay Under to Surface	$ 8,500
Provide Escalator Scollay Under to Scollay Platform in Existing Escalator Well	65,000
Replace Subway Structure at Surface where Excalator and Stairs Removed	4,500

Adams

Remove Stairs to Abandoned Platform	3,000
Replace Subway Structure at Surface	2,500

Union - Friend

Alterations to Lobby upon Demolition of Buildings	10,000

Haymarket

Remove Southeast Stairway	2,500
Replace Subway Structure at Surface	3,500
Total -	$ 99,500
15% Engineering & Contingencies -	14,925
Grand Total -	$114,425